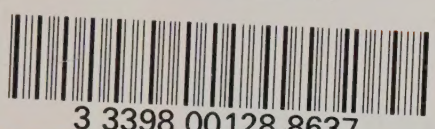


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Farming Peat Soils in Alberta.



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FARMING PEAT SOILS IN ALBERTA

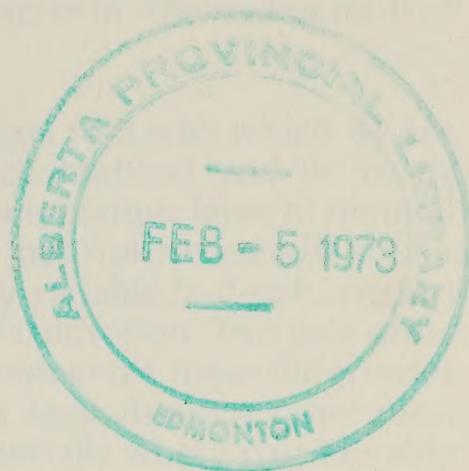
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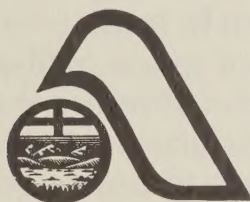
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FARMING PEAT SOILS IN ALBERTA



**Soils Branch
Plant Industry Division
Alberta Department of Agriculture**




Minister
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FARMING PEAT SOILS IN ALBERTA

Occurrence - Peat soils or muskeg areas are found mostly in the grey wooded areas of Alberta. Individual peat bogs vary in size from a few acres to thousands of acres. It is estimated that peat covers up to 25 million acres in Alberta but most of this is in non-agricultural areas.

Character - Peat soils are very different from the mineral soils with which we are familiar. They consist of an accumulation of undecomposed and/or partly decomposed plant material usually underlain by an impervious layer of mineral soil. Peats are formed under cool moist conditions, but not necessarily under water, and may occur on sloping land. They are **highly variable** in depth, acidity, fertility, depth to water table, frost hazard and ease of cultivation. Two peat areas on one farm can be very different. It is important to recognize these differences before embarking on development of peat areas for agriculture or other uses. The development of peat soil areas can be costly especially where considerable drainage is required. Consideration must be given to the expected returns in terms of forage production for hay or pasture from the developed peat soil area.

In Alberta peat soils have been classified as sedge (*Eaglesham series*) and mosses (*Kenzie series*), but most are mixtures of the two.

1. *Sedge peat*: Sedges are grass-like, water loving plants which may grow in nearly pure stands, but are more frequently mixed with shrubs, small trees and mosses. Sedge peats usually form in depressional areas where outflow of water is restricted. Sedge bogs may develop to depths greater than ten feet. As long as the water table remains near the surface, the sedges will continue to grow and decomposition of the dead plant material will be slow. Unless the water table can be lowered, these peats should not be considered for development. When the water table is lowered either naturally or by drainage, sedge will decompose leaving a dark colored fibrous residue. These sedge bogs are often less than three feet in depth and are suitable for agricultural development. They may be subject to periodic flooding, in which case suitable drainage is necessary.



Figure 1 - A Typical Sedge Peat Area

2. **Moss peat:** Mosses are simple, moisture loving plants of which sphagnum mosses are the most common. Moss bogs usually have a variable cover of shrubs and trees including Black Spruce, Tamarack, Swamp Birch, Labrador Tea, etc. These bogs are sometimes more than 10 feet deep, but large shallow areas two to five feet deep are common. Undecomposed moss is very infertile and is used for horticultural purposes. Well decomposed moss peats are moderately fertile, and shallow areas may be considered for agricultural uses.

Utilization

1. **Peat Moss Industry:** The main requirement of horticultural peat moss is its high water holding capacity. Undecomposed sphagnum moss will retain up to 12 times its weight of water. Several peat moss plants are in operation in Alberta. Peat is a valuable source of organic matter for use as a soil conditioner in gardens, parks and the greenhouse industry. It helps to loosen heavy clay soils and to bind loose sandy soils.

2. **Agriculture:** Peat soils have several limitations which should be considered before developing.

(a) **Acidity** - Peat soils range from acid (pH 3.5) to slightly alkaline (pH 7.5). If the pH is above 5.5 and little or no soluble salts are present the area may be considered for cropping. The pH and salt content can be determined by a soil test provided by the Agricultural Soil and Feed Testing Laboratory, O.S. Longman Building, Edmonton. Soil sample containers and instructions are available from District Agriculturists' offices and fertilizer dealers.

(b) **Growing Season** - Most peat soils are found in the grey wooded soil zone where the frost-free season is relatively short (75 - 90 days). Peat soils are cold soils and since they are frequently found in depressional areas, the frost free period may be 10 to 15 days shorter than on the adjacent mineral soils, (See Table I)

Table I - Frost Free Period of Peat Soil Sites Compared To
Nearby Meteorological Station Observations

	DAYS FROST FREE			
	LESLIEVILLE Peat Soil		ROCKY MOUNTAIN HOUSE Met. Site	
Year	28°F	32°F	28°F	32°F
1962	57	16	117	116
1963	104	17	142	122
1964	84	25	131	90
1965	103	74	116	105
1966	115	52	154	131
1967	61	46	154	92
Av.	87	38	136	109
	NITON JUNCTION Peat Soil		EDSON Met. Site	
	28°F	32°F	28°F	32°F
1968	92	9	126	82
1969	92	47	93	60
1970	88	67	104	66
Av.	91	41	108	69

(c) Water Table - Peat bogs naturally develop where the water table is near the surface during most of the growing season. Most agricultural crops grow best when the water table is two to three feet from the surface. It therefore may be necessary to lower the water table to grow crops effectively.

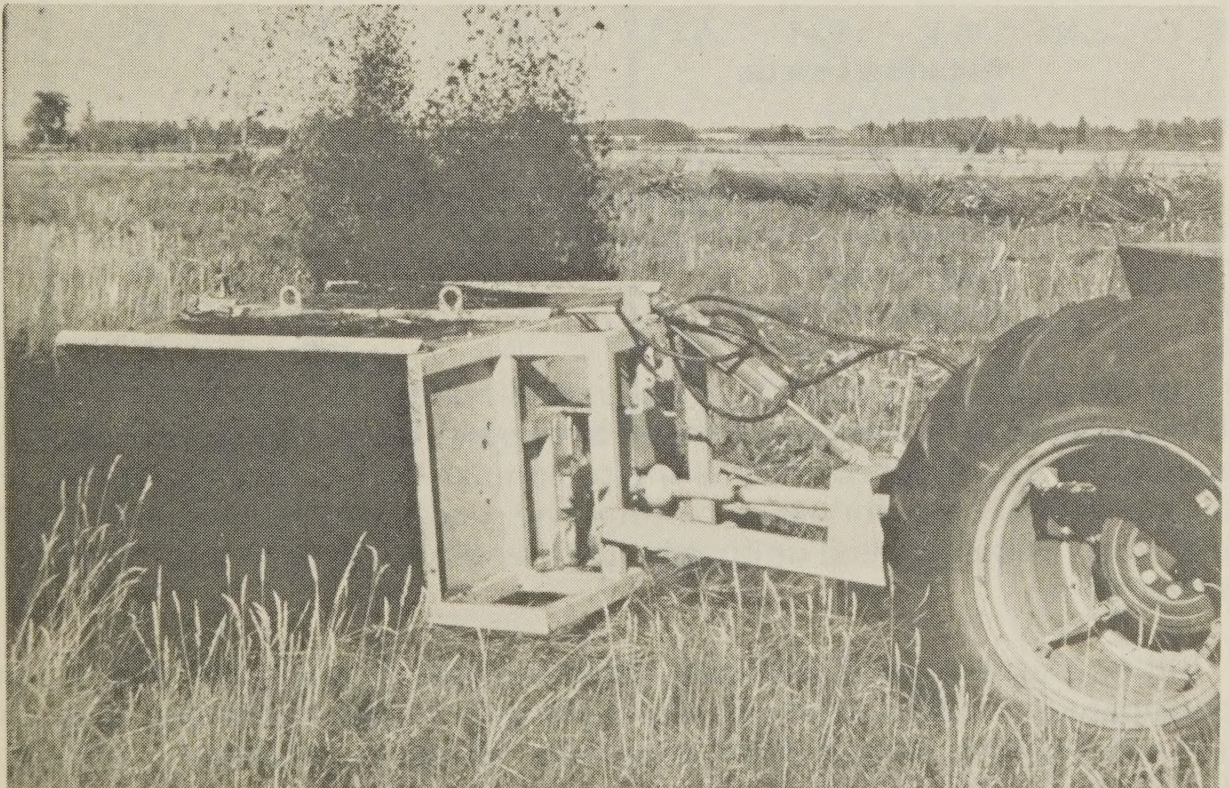
Normal precipitation is relatively high during the growing season, but crops will generally utilize this water for growth. During periods of excessive summer precipitation the water table may rise and crops may be flooded.

(d) Cropping - Cereal crops are difficult to mature due to the short growing season. Oats have been successful crops on peat soils.

Clearing - Clearing of peat areas, when required, is easier to do in winter when the soil is frozen. This will leave the roots in the ground where they may interfere with the breaking operation. If clearing can be done in the summer, many of the roots will be removed prior to breaking. Burning of windrows must be carefully timed to avoid burning of the peat soil.

Draining - Peat soils usually require draining to ensure flooding will not be a problem. Deep or closely spaced drainage ditches are not practical under Alberta conditions. Drainage, sufficient to remove spring run-off, is usually all that is required. Shallow ditches at quarter mile intervals are usually adequate. These ditches can be made using the back hoe when the area is accessible. The use of several properly spaced dynamite charges has also been successful but should be done only by experienced personnel. For more information, obtain the publication 758, "Blasting Ditches, Stumps, Boulders and Ponds", prepared by Canadian Industries Ltd. from your District Agriculturist or Regional Agricultural Engineer. A flail type ditcher recently developed in Alberta has proved effective and economical.

Figure II - Flail type ditcher used to make drains in peat soil areas.



Breaking - Newly cleared land will be difficult to break, especially if there are many roots. Heavy duty roto-tillers or large single bottom plows have been satisfactory. Gang plows tend to plug. Grass seed may be broadcast on newly cleared land and then grazed for a number of years. This will permit compaction and decomposition. Breaking with a moldboard plow or roto-tiller will then be much more effective. Pure or nearly pure sedge peat will not require clearing and will be easy to break provided the water table is at least two to three feet from the surface. Breaking should be 10 to 14 inches deep. On shallow peats, do not attempt to mix subsoil with the peat.

Tillage and Seeding

Peat soil should be plowed, disced as necessary and then packed to make a firm seedbed. Since peat tends to be loose and fluffy (*low bulk density*), special practices to pack the soil to provide a firm seedbed are usually necessary. A heavy roller has been found to be best. Crowfoot or spiral packers are not satisfactory. Conventional seeding methods may be used but broadcast seeding is also satisfactory since moisture is usually at the surface when well packed.

Harvesting - The soil surface usually remains moist under a windrow even when the water table is three or more feet below the surface. Thus, drying of hay or grain in windrows is difficult if not impossible unless supported off the ground.

Forage Crops - Data on forage crop adaptability on Alberta peat soils is limited. The following species have proven to be adaptable on peat soils which are subjected to some flooding:

Reed Canary Grass
Timothy
Alsike Clover

The following species are known to be adaptable to cool moist conditions and are worthy of trial:

Meadow Fescue
Tall Fescue
Creeping Red Fescue
Meadow Foxtail (Alopecurus pratensis)*
Creeping Foxtail (A. arundinacea)*
Red Clover
Birdsfoot Trefoil

*Seed of the foxtails is grown in N.W. United States and may not be readily available in Alberta, but can be obtained by reputable seed houses. The foxtails are adaptable to cool wet conditions and preliminary tests indicate that they will produce excellent crops for hay or pasture. The seed is very light and difficult to handle, thus difficult to seed uniformly. Trail seeding at 8-10 pounds per acre is recommended.

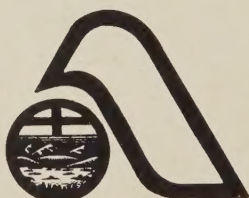
Although grass and legume mixtures have not been evaluated on peat soils, it is anticipated that either alsike or red clover grown with one of the adaptable grasses will improve forage yield, especially where no nitrogen fertilizer is applied. Legume seed should be inoculated before seeding.

Fertilizer Use - All grasses respond to added nitrogen and up to 50 pounds per acre (150 lbs. 34-0-0) have been profitable. Table II shows the yield responses of reed canary grass, timothy and brome for 4 years. Average yields without fertilizer for the three grasses were 1,580, 1,340 and 1,380 lbs. per acre compared to 2,330, 2,460 and 2,470 lbs. per acre with an application of 50 lbs. of nitrogen per acre. Note the variation in yields, between years and that brome was lost by flooding in 1970. Also note that the reed canary grass and timothy responded to the added potassium in 1971.

Table II - Yields of Forage on Peat Soil at Niton, Alberta

FERTILIZER TREATMENT (1b./ac.)			YIELD OF FORAGE (cwt./ac.)				
Nitrogen Phosphorus Potassium			1968	1969	1970	1971	4 Yr. Av.
(N)	(P ₂ O ₅)	(K ₂ O)					
REED CANARY GRASS							
0	0	0	6.2	14.2	16.7	26.1	15.8
50	0	0	17.4	18.0	21.9	36.0	23.3
50	40	0	20.2	22.9	31.9	32.2	29.6
50	40	40	24.9	19.6	37.0	55.2	34.2
TIMOTHY							
0	0	0	10.4	8.5	4.9	30.0	13.4
50	0	0	29.8	21.7	19.9	26.8	24.6
50	40	0	34.6	20.2	29.0	30.5	28.6
50	40	40	33.8	24.2	26.4	44.6	32.2
BROME							
0	0	0	13.8	13.7	no stand (Flooded)		13.8
50	0	0	27.9	21.6			24.7
50	40	0	29.4	21.9			26.6
50	40	40	35.5	24.3			29.9

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